Journal of Forensic and Legal Medicine 18 (2011) 237–241

Contents lists available at ScienceDirect

Journal of Forensic and Legal Medicine

journal homepage: www.elsevier.com/locate/jflm

Case report

Fatal injury by an unmodified blank pistol: A case report and review of the literature

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ARTICLE INFO

Article history:
Received 29 March 2011
Received in revised form
3 May 2011
Accepted 10 May 2011
Available online 1 June 2011

Keywords:
Blank cartridge
Death
Autopsy

ABSTRACT

In this paper, we report a fatal neck injury of suicidal origin of a 29-year-old man. A 9-mm blank pistol and several blank cartridges in a plastic bag were discovered near the victim. There was an irregular and contuse oval contact-entrance wound of 25 mm × 20 mm with a muzzle imprint on its upper medial part on the right side of the neck. The cause of death was exsanguination due to injuries to the right external carotid artery and the right jugular vein. This case confirms that blank pistols, contrary to public opinion, are dangerous and may inflict potentially fatal injuries when fired at close or contact range. In addition, previously reported 18 fatal injuries by blank cartridges caused by unmodified blank pistols between 1990 and 2009 are reviewed and summarized. It is concluded that as blank pistols may cause fatal injuries even without any modification, it is necessary to develop new standards for their production.

1. Introduction

A blank cartridge is intended to produce noise. Blank cartridges are generally loaded with ultra-fast burning powder that detonates rather than burns. The case itself may appear like any other case in this caliber or may have a rosette-crimped end.[1]

The development of blank pistols is closely related to the regulations restricting the availability of firearms for civilians. Today these guns mostly represent imitations of handguns, which in design and function very closely resemble the original weapons for standard ammunition of various caliber.[2,3] Initially, blank cartridge injuries were often termed “Fourth of July injuries” in the US literature because they occurred on this holiday when blank pistols were used as noisemakers.[3]

Upon simple modifications such as removing the obstruction in the barrel, these blank pistols gain the ability to propel small balls placed inside the cartridge or handmade projectiles inserted into the tip of the cartridges.[4–6] However, even without any alteration to it, the expanding propellant powder gas can cause severe and even lethal injuries when fired at close or contact range.[7]

Blank pistols are not considered firearms in most countries.[5] In Turkey, blank pistols are authorized to be sold to anyone over 18 years of age. Therefore, any adult over 18 can purchase a blank pistol and blank cartridges. However, not infrequently, these weapons are used in criminal activities. In the metropolitan area of Hamburg, Germany, for example, 500 annual incidents involving guns are recorded in criminal statistics, which 40% of the time result in the firing of a gun. In 70–80% of these cases, blank pistols are involved.[8]

Although some case reports stress the danger of this type of weapon and its potentially lethal effects when used at close or contact range, the potential of these weapons to inflict serious and potentially lethal injuries is still grossly underestimated. We report this case to illustrate this possible danger, and similar fatal injury cases in the literature are reviewed.

2. Case report

A 29-year-old man was found dead in his bed. A 9-mm blank pistol and several blank cartridges in a plastic bag were discovered near the victim (Fig. 1). There was a bloody knife and a bloody razor blade on a carton box on the right side of the victim (Fig. 2). Blood was observed on the blank pistol and on its muzzle (Fig. 3). There was a cartridge case on the floor.

An irregular and contuse oval contact-entrance wound of 25 mm × 20 mm with a muzzle imprint on its upper medial part on the right side of the neck and superficial cuts below this injury were observed (Fig. 4). There were also superficial cuts on the left side of his neck.

At autopsy the subcutaneous tissues underneath the skin defect showed a light red color. The wound consisted of an extensive

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doi:10.1016/j.jflm.2011.05.005

Fig. 1. The victim found lying on his bed and the blank pistol near him.

cavity filled with powder particles and blood. Hemorrhage in soft tissues in the neck and injuries of right external carotid artery and right jugular vein were observed. No projectile or parts of a projectile were found during the radiologic examination.

On the flexor side of the left wrist, a singular, transverse, 5-cm-long cut wound was observed that reached down into the subcutaneous fatty tissue. No major blood vessels were affected.

The cause of death was exsanguination due to the injuries of right external carotid artery and right jugular vein.

3. Discussion

The legal requirements for blank pistols include metal devices inside the barrel and chamber that cannot be removed with commonly available tools. This design prohibits loading and firing of projectiles. Blank cartridges typically contain black powder or nitrocellulose as an explosive and a small amount of ignition material inside a primer cup. The explosive may be contained in a plastic capsule and a separating layer of paper or cork. The general

Fig. 2. A bloody knife and a bloody razor blade on the box (arrows).

Fig. 3. Blood on the muzzle of the gun.

public and authorities largely regard these weapons as harmless, and few restrictions on sale and carry apply.[2,9]

The gas pressure created when firing a blank pistol at contact or at a distance of only a few centimeters can cause considerable or even fatal injuries.[3,7,9,10] Ballistic considerations and wounding patterns suggest that the gas jet alone generated by a non-manipulated commercially available blank pistol demonstrates the characteristics of a projectile when fired at a close range.[2,10,11] Blank cartridge is available in several loads and caliber sizes. Ignition of a 9-mm load for a revolver, for example, will lead to the expansion of a pressure wave at 1200 to 1500 m/s creating a gas volume of 950 mL/g for nitrocellulose and 280 mL/g for black powder. The explosion leads to a pressure of 100–200 bar at the muzzle of the handgun.[2] For a barrel length of 105 mm, a 9-mm load can create a pressure of approximately 5, 3, and 1 bar at a distance of 3, 5, and 10 cm, respectively. The energy density in such a case may be equivalent to 0.75, 0.27, and 0.1 J/mm^2 at 0, 5, and 10 mm, respectively. A projectile has the theoretical capacity to penetrate human skin at an average of 0.1 J/mm^2.[7,12]

Fig. 4. Superficial cuts and a 25 × 20–mm, oval-shaped defect with a muzzle imprint on its upper medial part on the right side of the neck.

In the civilian population, blank cartridge injuries and death are rare. It is unlikely for a civilian forensic pathologist to ever see one.[1] Contact or very close-range firing may produce a large irregular entry wound surrounded by a punch mark due to the expanding gas volume inside the wound. The skin may burst in a star-like pattern because of the violent pressure increase between the muzzle and a solid bone-like structure. Although this pattern may also occur in bullet gunshot injuries, it is often more pronounced with gas weapons because the expanding gas volume cannot follow the path of a penetrating projectile.[2]

The wound may be filled with burned tissue debris from the load, such as powder, paper, or cork from dispersing materials inside the cartridge. Therefore, the course of these injuries has a high risk of being complicated by infections, due to the skin flora, or by contamination from the cartridge load (particularly *Bacillus cereus*). Moreover, firing the load does not necessarily sterilize the foreign material entering the wound.[12,13]

In clinical practice, the morphology of the entry wounds from blank pistol injuries is not sufficient to differentiate these lesions from projectile injuries, and the clinical status of the patient, as in projectile injuries, may vary greatly. In many cases, at presentation the type of weapon involved remains unclear. However, in gunshots from blank cartridges, exit wounds are never observed.[2]

Neck injuries caused by blank cartridges have been occasionally described.[7–9,14] Due to the anatomical conditions, the pathways supplying vital structures are situated close together, especially in the neck. Fatalities caused by blank cartridges are usually the result of massive blood loss due to ruptured large blood vessels.[7,10] In the present case, the cause of death was exsanguination due to the injuries of right external carotid artery and right jugular vein.

A review of the literature about fatal injuries caused by unmodified blank pistols revealed 18 cases in a 20-year period between 1990 and 2009. Table 1 gives a summary of these cases. The age of the victims ranged from 17 to 87 years (mean 41.1 ± 22.9 years, median 32.5 years) in 12 males and 6 females. The manner of death was suicide in 14 cases, accident in 3 cases and homicide in 1 case. The location of the wound was the right or left temple in six cases, the right or left side of the neck in four cases and the anterior chest region in four cases. In two cases, there were wounds on multiple regions (head and neck), so all of the fatal injuries were on the head, neck and chest. Of these cases, six were fatal neck injuries similar to our case (cases 3, 5, 9, 10, 11 and 12 in Table 1). In addition to deaths by unmodified blank pistols that have been reported in the literature, Zdravkovic et al.[15] recently reported three cases of lethal injuries caused by 7.62 mm blank cartridge shots from military automatic rifles of domestic origin.

The case presented in this study is a “complex suicide,” as both a blank pistol and sharp instruments were used to achieve suicide. To our knowledge, the only previous complex suicide case in which a blank pistol was used as one of the suicide methods was reported by Bohnert and Rothschild.[19] In that case, a 33-year-old man shot himself in the head with a blank pistol in the middle of the street near his home. The other suicide methods were self-incineration

Table 1
Fatal injuries due to unmodified blank pistols in the literature between 1990 and 2009.

No	Age	Gender	Manner of death	Localization of the wound	Cause of death	Year	Authors
1	25	F	Suicide	Left chest	Exsanguination due to rupture of pericardium and apex of heart	1990	Jacob et al.[10]
2	87	M	Suicide	Right temple	Massive loss of blood from the injured branches of the right temporal artery	1994	Rothschild et al.[7]
3	19	F	Suicide	Left side of the neck	Blood aspiration	1994	Rothschild et al.[7]
4	57	M	Accident	Right inguinal region	Exsanguination due to femoral vein injury	1994	Rothschild et al.[7]
5	58	M	Suicide	Back of the neck and right temple	Air embolism and aspiration of stomach content	1994	Rothschild et al.[7]
6	18	M	Accident	Anterior side of the left chest	Exsanguination due to the rupture of the heart and hemothorax	1998	Rothschild et al.[16]
7	21	M	Homicide	Anterior side of the left chest	Cardiac tamponade due to the rupture of the heart	1998	Rothschild et al.[16]
8	69	F	Suicide	Parasternal region of the left chest	Cardiac tamponade due to the rupture of the heart	1998	Rothschild et al.[16]
9	23	F	Suicide	Right side of the neck	Exsanguination due to injury of the external carotid artery	1999	Rothschild and Vendura[9]
10	21	M	Accident	Left side of the neck	Exsanguination as a result of ruptured large cervical vessels	1999	Rothschild and Vendura[9]
11	77	M	Suicide	Right side of the neck, upper parietal region, right eyebrow, under the chin, hard palate	Exsanguination as a result of ruptured large cervical vessels	1999	Rothschild and Vendura[9]
12	34	M	Suicide	Right side of the neck	Exsanguination as a result of ruptured large cervical vessels, blood aspiration, drowning	2001	Püschel et al. [8]
13	65	F	Suicide	Right temple	Epidural, subdural, intracerebral hemorrhages and brain contusion	2002	Giese et al.[2]
14	40	M	Suicide	Right temple	Right temporal subdural and bilateral intraventricular hemorrhage	2003	Clarot et al.[3]
15	54	F	Suicide	Mouth	Aspiration of blood and stomach content	2005	Bungardt et al.[17]
16	31	M	Suicide	Right temple	Epidural and subarachnoidal hemorrhage	2008	Demirci et al.[18]
17	23	M	Suicide	Right temple	Right temporal subarachnoidal hemorrhage and contusion of right temporal lobe	2009	Buyuk et al.[4]
18	17	M	Suicide	Left temple	Left temporal subarachnoidal hemorrhage and brain injury	2009	Buyuk et al.[4]

and wrist cutting. However, the blank pistol injury in that case was not lethal, and according to the autopsy findings, the man died of cardiovascular failure due to extensive burns of the body surface.

4. Conclusion

This case report and the literature review of the fatal injuries by blank cartridges confirm that blank pistols, contrary to public opinion, are dangerous and may inflict potentially fatal injuries when fired at close or contact range. Although this issue has been reported in the literature many times in the last 20 years, the production technique of blank pistols has not changed much. As blank pistols may cause fatal injuries even without any modification, it is necessary to develop new standards for their production.

It would be useful to educate the blank pistol salesmen to warn the people who want to buy these pistols and to mechanically reduce the gas jet pressure to limit its wounding capacity because pistols without projectiles are still dangerous.

Conflict of interest
None.

Funding
None.

Ethical approval
None.

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